

**BREAST RECONSTRUCTION AFTER MASTECTOMY: A SURVEY OF
SURGEONS'
AND PATIENTS' PERCEPTION**

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**DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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IV. List of Abbreviations

HRPZ II	Hospital Raja Perempuan Zainab II
HKL	Hospital Kuala Lumpur
HUSM	Hospital Universiti Sains Malaysia
MOH	Ministry of Health
SPSS	Statistical Package for Social Science

V. Abstrak

Pengenalan

Pembedahan rekonstruktif payudara selepas mastektomi adalah satu komponen yang penting dalam rawatan kanser payudara.

Kaedah

Kajian keratan-lintang ini bertujuan untuk menilai persepsi terhadap pembedahan rekonstruktif payudara di kalangan pakar bedah dan pesakit kanser payudara. Kaji selidik telah diedarkan kepada semua pakar bedah am dan pakar bedah payudara di hospital Pantai Timur dan Hospital Kuala Lumpur (n=40), pesakit selepas pembedahan mastektomi tanpa (n=291) dan dengan pembedahan rekonstruksi (n=66) dari Hospital Universiti Sains Malaysia (HUSM) and Hospital Raja Perempuan Zainab II (HRPZ II). Kadar respon adalah sebanyak 82.5% bagi pakar bedah (n=33), 95.4% bagi pesakit dengan rekonstruksi (n=63) dan 95.5% pesakit tanpa rekonstruksi (n=278).

Keputusan

Analisis 30 pakar bedah am dan pakar bedah payudara (3 dikecualikan kerana 1 pakar bedah tidak lagi merawat pesakit payudara dan 2 respon tidak lengkap) menunjukkan median umur pakar bedah adalah 42 tahun dengan 6 tahun pengalaman. Setiap pakar bedah melihat 20 kes kanser payudara baru setahun. Majoriti (86.7%) berbincang mengenai pembedahan rekonstruktif dengan pesakit. Namun, kadar rujukan adalah rendah di mana

setiap pakar bedah hanya merujuk purata 4 kes bagi pembedahan rekonstruksi dalam tempoh 3 tahun. Ketidakpastian mengenai hasil kualitatif pembedahan rekonstruksi meningkatkan kemungkinan perbincangan mengenai pilihan tersebut dengan pesakit ($B=4.833$, $p=0.044$).

Analisis dari 302 pesakit (39 dikecualikan kerana respon yang tidak lengkap) menunjukkan wanita dalam kumpulan rekonstruktif adalah lebih muda (purata umur 42 vs 50 tahun), kebanyakannya bekerja (69.4% vs 42.2%) dan mempunyai pengetahuan awal mengenai pembedahan rekonstruktif (90.3% vs 44.3%) berbanding wanita tanpa rekonstruksi.

Faktor utama dilaporkan untuk menjalani pembedahan rekonstruksi payudara adalah ‘untuk merasa lebih seimbang’ (92.1%) dan ‘saranan kuat pakar bedah’ (92.1%). Pengetahuan awal mengenai pembedahan rekonstruksi payudara meningkatkan kemungkinan bagi menjalaninya ($OR:5.805$, $p=0.026$).

Walaupun tiada pakar bedah melaporkan tidak berpuas hati dengan hasil rekonstruksi, 21.8% pesakit mengatakan tidak terkesan dengan hasil yang telah dilihat. Walaupun 70% pakar bedah merasakan pesakit tidak akan berminat walaupun diberikan pilihan, hanya 37.9% pesakit yang ada kesedaran awal atau tawaran pembedahan rekonstruktif payudara menyatakan tidak berminat dengannya.

Kesimpulan

Kadar pembedahan rekonstruktif yang rendah (20.6%) mungkin disebabkan oleh kadar rujukan yang rendah. Tanggapan pakar bedah mengenai pembedahan rekonstruktif memainkan peranan dalam kadar rujukan. Kebarangkalian pesakit untuk menjalani pembedahan rekonstruktif dengan adanya saranan pakar bedah dan kesedaran awal menunjukkan pengaruh kuat pakar bedah terhadap pesakit. Maka, memperbaiki sebarang salah anggap di kalangan pakar bedah mungkin dapat membantu meningkatkan kadar rekonstruktif payudara di kalangan pesakit kanser payudara.

VI. Abstract

Background

Breast reconstruction post-mastectomy is important in breast cancer care.

Methodology

A cross-sectional study was designed to assess surgeons' and patients' perceptions towards breast reconstruction. Questionnaires were distributed to all general and breast surgeons in East Coast Malaysia's general and teaching hospitals and Hospital Kuala Lumpur (n=40), post-mastectomy patients with (n=66) and without breast reconstruction (n=291) from Hospital Universiti Sains Malaysia (HUSM) and Hospital Raja Perempuan Zainab II (HRPZ II). Response rates were 82.5% surgeons (n=33), 95.4% patients with reconstruction (n=63) and 95.5% patients without reconstruction (n=278).

Result

Data from 30 surgeons (3 excluded as 1 surgeon no longer treating breast diseases and 2 incomplete responses) showed median age of 42 years with 6 years' experience. Each surgeon saw average 20 new breast cancer cases a year. Most surgeons (86.7%) discussed reconstruction option with patients. However, referral rate was low whereby each surgeon referred only average 4 cases for reconstruction over 3 years. Surgeons' concern on qualitative outcome increases the likelihood of discussion regarding breast reconstruction with patients (B=4.833, p=0.044).

Data from 302 patients (39 exclusion for incomplete responses) showed women with reconstruction were younger (mean age 42 vs 50 years), more were working (69.4% vs 42.2%) and have prior awareness (90.3% vs 44.3%) compared to non-reconstruction group. Commonest reasons for having reconstruction were ‘to feel more balanced’ (92.1%) and ‘surgeon’s strong recommendation’ (92.1%). Prior knowledge on breast reconstruction increases likelihood of reconstruction (OR:5.805, p=0.026).

While no surgeons have concern on reconstructive surgery outcome, 21.8% patients were unimpressed with previous outcome seen. Although 70% surgeons felt that patients may not be interested in reconstruction, only 37.9% patients with prior awareness claim to have no interest.

Conclusion

The study’s low reconstruction rate (20.6%) may be attributed to low referral. Surgeons’ hypothetical criticisms may play some role in the referral rate. Patients’ likelihood to undergo reconstruction with surgeons’ recommendation and prior awareness were reflective of surgeons’ strong influence on patient. Thus clarification on surgeons’ hypothetical criticisms may conceivably increase the reconstructive surgery rate.

1.0 INTRODUCTION

1.1 Introduction

Mastectomy is a traumatic life event in a woman diagnosed with breast cancer. However, it remains an important surgical option despite improvements in screening and diagnosis, as well as advances in breast cancer treatment (Iacob et al., 2015). The loss of a breast is a life-changing event and the aesthetic, physiological, and psychological sequelae can be profound (Baildam, 2006). Body image and sexual problems were experienced by a substantial proportion of women in the early months after diagnosis. The distress that comes from mastectomy may be more pronounced in younger women, as a result of significant treatment-related distress and changes in body image and sexuality during the course of the illness (Tripathi et al., 2017).

The combination of breast-conserving surgery and the concomitant use of plastic surgery techniques has allowed improved satisfaction, self-esteem, body-image, and overall, the quality of life of many women with breast cancer. Currently, most patients can overcome this disease without necessarily resulting in serious physical mutilation (Garcia-Etienne et al., 2012).

In Malaysia and in particular East Coast of Malaysia, patients presented at an earlier age and later stage of disease compared to women in Western countries, rendering breast-conserving surgery less feasible (Norsa'adah et al., 2011; Yip et al., 2014). Asian breasts are smaller therefore breast-conserving surgery resulted in poor aesthetic outcome. Therefore, mastectomy and breast reconstruction provides better options for most patients (Yang et al., 2011).

Determining the optimal proportion of patients who should undergo breast reconstruction after cancer surgery represents a complex task, as the decision-making process about reconstructive options is influenced by patient's preference, surgeon's preference and skills, and available service. These factors may vary widely among countries or geographical areas because of differences in cultural aspects and economic resources (Garcia-Etienne et al., 2012).

The most frequently reported reasons for having reconstruction given by the reconstruction group included to get rid of the external breast prosthesis, to be able to wear many different types of clothing, to regain femininity and to feel whole again (Reaby, 1998).

Meanwhile, the most prevalent reason for not undergoing breast reconstruction was the fear of cancer relapse (Nozawa et al., 2015), fear of the complications (Reaby, 1998) and perception of self-being too old for the procedure (Reaby, 1998). Other factors mentioned were to avoid additional distress on the body from surgery, financial reasons, and beliefs that breast reconstruction is unnecessary (Nozawa et al., 2015).

Some patients experienced difficulty in making the decision to have breast reconstruction due to inability to have specific types of reconstruction, lack of family support, and friends' and acquaintances' perception towards breast reconstructive surgery (Reaby, 1998).

It has been shown that women who had completed breast reconstruction showed higher self-evaluations of physical attractiveness and were more active (Nozawa et al., 2015). However, breast reconstruction is yet to be widely accepted (Postolica et al., 2013). The rate of reconstructive surgery post-mastectomy is still low in Malaysia despite the increasing availability of plastic surgery service throughout the country (Shameem et al., 2008).

The lack of information regarding reconstruction (Postolica et al., 2013), financial implications (Postolica et al., 2013; Shameem et al., 2008), inequity of access to optimal treatment (Shameem et al., 2008) and fear of additional surgery (Shameem et al., 2008) remain significant barriers to reconstructive surgery. The surgeon's opinion has a major influence and women with breast cancer should be considered as a vulnerable population in need for better information related to reconstruction after mastectomy (Postolica et al., 2013). High-referral surgeons and low-referral surgeons also had different beliefs about women's preferences for reconstruction, with the low-referral surgeons perceiving more access barriers (cost, availability of plastic surgeons) and a lower patient priority for reconstruction (Alderman et al., 2007).

With the persistent low rate of reconstructive surgery post-mastectomy in breast cancer, there have yet a study conducted to evaluate both surgeons' and patients' perception with regard to breast reconstruction in same setting. By concurrent evaluation on surgeons' and patients' view on breast reconstruction, we would be able to evaluate whether surgeons' view were in accordance to patients' wish and desire. This would further enable

us to determine the contributing factors for low referral practice be it due to surgeons' factor, patients' preference or practice barriers to co-management.

This study aims to discern the perception of women and general surgeons towards breast reconstruction after mastectomy especially with regards to women over East Coast of Malaysia and Hospital Kuala Lumpur and to ascertain the factors that would favor towards reconstruction or against it. Additional effort is necessary to broaden the use of breast reconstruction and to ensure equitable access to it.

1.2 Literature Review

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death among females, accounting for 23% of the total cancer cases and 14% of the cancer deaths worldwide (Jemal et al., 2011).

The Malaysian National Cancer Registry (NCR) 2003-2005 reported an age-standardized rate (ASR) of 47.3 per 100 000. The incidence is highest in Chinese (59.9 per 100 000) followed by Indians (54.2 per 100 000) and Malays (34.9 per 100 000) (Lim et al., 2008). The International Agency for Research in Cancer (GLOBOCAN) 2012 estimated the ASR of breast cancer in Malaysia as 38.7 per 100,000 with 5410 new cases in 2012 (Yip et al., 2014).

Malaysian women present at an earlier age as compared to women in Western countries. A collaborative study between two tertiary academic hospitals in Malaysia, and Singapore found that approximately 50% of women were diagnosed before the age of 50 years (Pathy et al., 2011), in contrast to most Western countries such as UK and Netherlands whereby 20% are diagnosed before age 50 (Yip et al., 2014). Malaysian women also present at later stages compared to women in Western countries (Yip et al., 2014).

Women who developed breast cancer were more likely to experience reduced physical function, role function, vitality, and social function (Michael et al., 2000). Negative perceptions of body image among breast cancer survivors include dissatisfaction

with appearance, perceived loss of femininity and body integrity, reluctance to look at one's self-naked, feeling less sexually attractive, more self-consciousness about appearance, and dissatisfaction with surgical scars (Fobair et al., 2006).

Norsa'adah et al., (2011) reported between 2005 and 2007, most patients with breast cancer underwent mastectomy (73.8%) and only 19.2% had breast-conserving surgery. Nevertheless, there have been no large local studies on breast-conserving surgery versus mastectomy (Yip et al., 2014).

Breast reconstruction involves the transfer of healthy autologous tissue into the mastectomy site with the subsequent sculpting of the living tissue into a breast shape, the use of prosthetic implants, or the use of both of these together (Baildam, 2006). For many women, breast reconstruction has a deep significance as a symbol of conquering cancer, for others reconstruction may be the beginning of their taking up again their normal living and working activities (Baildam, 2006).

A study in University Malaya Medical Centre has shown breast reconstruction rate ranging from 1 to 9.2% between the year 2000 and 2005 (Shameem et al., 2008). A similar scenario was also observed in Singapore which is in contrast to the West whereby as many as 30% of eligible patients undergo some form of reconstruction (Lim et al., 2008).

Fallbjork et al., (2010) found that women in the breast reconstruction group have significantly lower mean age, but higher education level and a higher proportion were employed. Most women were influenced by the physician's opinion regarding breast

reconstruction, were sexually active, and rated a negative impact concerning the attractiveness factors and body disclosure.

Breast reconstruction can be delayed or immediate, depending upon the choices made at the time of cancer surgery (Baildam, 2006). These will depend on the cancer stage and the options for adjuvant treatment, including any need for postoperative radiation (Baildam, 2006).

Guyomard et al., (2007) and Iacob et al., (2015) have found that post-mastectomy patients with breast reconstruction were satisfied with breast reconstruction whatever the technique used due to the increase of their life quality, whereas age or procedure timing did not affect general satisfaction. Breast symmetry, size, shape and scars and nipple reconstruction were reported as influencing the patients' score (Guyomard et al., 2007).

A survey among general surgeons conducted in Singapore showed almost 80% of responding surgeons felt that reconstruction was worth the effort (Lim et al., 2001). However, previous surveys have shown that significant concerns have been raised even among surgeons who were in favour of breast reconstruction. These concerns include (1) the possibility of masking local recurrence (Lim et al., 2001; Mendelson, 1981; Spyrou et al., 1998); (2) disappointing results of reconstruction (Mendelson, 1981); (3) oncologically inadequate mastectomies (Lim et al., 2001; Mendelson, 1981); (4) high morbidity of breast reconstruction (Spyrou et al., 1998), and (5) patients' disinterest in breast reconstruction despite being advised of its availability (Lim et al., 2001; Mendelson, 1981; Spyrou et al., 1998).

Nevertheless, complications can and do occur, and women should not be given unachievable expectations (Baildam, 2006). However, in a large cohort with invasive breast cancer followed over 20 years, there is no evidence that breast reconstruction is associated with worse survival outcomes compared with mastectomy alone (Platt et al., 2015).

Initially, reconstruction was entirely a delayed process, taking place sometimes many years after the mastectomy (Baildam, 2006). Techniques have been developed rapidly with attention to detail and consequently improvement in outcomes (Tzafetta et al., 2001). Immediate breast reconstruction is now recognized as a safe procedure from the oncological point of view and has series of advantages, such as better aesthetic results compared to delayed reconstruction, attenuation of the sense of mutilation deriving from the mastectomy and a reduction in surgical time (Petit et al., 2001).

However, extra care must be taken in a patient who needs post-operative radiotherapy whereby, radiotherapy can undo the aesthetic result from immediate reconstruction due to impairment of wound healing process and capsular contracture phenomena (Kronowitz et al., 2006), yielding radiation-induced fibrosis with the impaired cosmetic outcome (Berbers et al., 2014). In patients who will receive or have already received post-mastectomy radiation therapy, the optimal approach would be delayed autologous tissue reconstruction after radiation therapy (Kronowitz et al., 2009; Schaverien et al., 2013).

In contrast, placing a definite implant after radiotherapy seems to lead to a higher complication rate, with clearly more implant failures. Thus, if implant reconstruction is chosen, it is advised to be performed prior to radiotherapy (Berbers et al., 2014).

Immediate breast reconstruction achieved in a single process combined with mastectomy has increased over the last few years due to its oncological safety for selected patients, the development of reliable, technically and aesthetically sophisticated reconstruction operations and its cost-effectiveness (Malata et al., 2000).

The evolution of skin-sparing mastectomy techniques with immediate breast reconstruction has significantly improved appearance and sensation and the easily achieved nipple-areola complex reconstruction using a combination of small local flaps and tattooing completes the result (Baildam, 2006). There is no evidence that immediate reconstruction delays adjuvant therapy within population cohorts (Baildam, 2006).

Furthermore, studies have found that the loco-regional recurrence rate in patient groups corrected for stage is no higher in patients who receive immediate over delayed reconstruction (Kroll et al., 1991; Carlson et al., 1997; Kroll et al., 1997; Slavin et al., 1998; Kroll et al., 1999) and there is no evidence that immediate breast reconstruction masks local recurrence (Baildam, 2006).

Age itself is not a risk factor for poor surgical outcomes and evidence strongly suggests that it would be beneficial to offer elderly patients reconstructive surgery, dependent on their individual risk (Walton et al., 2011). The presence of metastatic disease

at presentation is in itself not a contraindication to reconstruction (Behnam et al., 2003) but the focus of disease management becomes systemic (Durrant et al., 2011). A survey conducted by Durrant et al., (2011) showed the majority of plastic and breast surgeons would consider breast reconstruction in those who developed distant disease that responds to systemic therapy.

Breast reconstructive surgery is an innovative, progressive, and sophisticated subspecialty with new cross-specialty training opportunities. For the woman who had undergone breast reconstruction, there are perceptual, functional and psychological advantages, but also recovery time from surgery and risks of complications that potentially increase in severity with ascent of the reconstructive ladder (Baildam, 2006).

1.3 Rationale of Study

Breast removal may have profound implications on psychological, social and sexual well-being of patients. Despite post-mastectomy breast reconstruction being an important aspect of breast cancer treatment and its quality of life benefits, not many underwent this aspect of treatment reflected in the low rate of reconstructive surgery post-mastectomy in breast cancer patients in this country.

Earlier studies have shown that general surgeons rarely discussed the option with patients (Lim et al., 2001; Takahashi et al., 2006; Alderman et al., 2008; Preminger et al., 2012). Previous studies have also demonstrated that patients' decision to undergo breast reconstruction may involve many complex factors. (Garcia-Etienne et al., 2012; Howard-McNatt, 2013)

In this study, we would like to determine the factors taken into account in discussing and referring breast cancer patients for reconstructive surgery and issues hindering against breast reconstruction post-mastectomy among general surgeon, especially over East Coast of Malaysia. In addition, we also aimed to ascertain reasons behind women for opting in or out of breast reconstruction.

In identifying the most relevant factors affecting surgeons' attitude and practice towards breast reconstructive surgery in breast cancer, and patients' concern and view on the matter, we hope to identify the impeding factors and in due course effectively embark

upon proper course in increasing the rate of reconstructive surgery among breast cancer patients and eventually offer patients better body image satisfaction and quality of life.

2.0 STUDY PROTOCOL

**BREAST RECONSTRUCTION AFTER MASTECTOMY: A SURVEY OF
SURGEONS'**

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2.1 Documents Submitted for Ethical Approval

Breast Reconstruction after Mastectomy: A Survey of Surgeons' and Patients' Perception

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1.0 Introduction

Mastectomy is a traumatic life event in a woman diagnosed with breast cancer. However, it remains an important surgical option despite improvements in screening and diagnosis, as well as advances in breast cancer treatment (Iacob et al., 2015). The distress that comes from mastectomy may be more pronounced in younger women, as a result of significant treatment-related distress and changes in body image and sexuality during the course of the illness (Tripathi et al., 2017).

The combination of breast-conserving surgery and the concomitant use of plastic surgery techniques has allowed improved satisfaction, self-esteem, body-image, and overall, the quality of life of many women with breast cancer. In Malaysia and in particular East Coast of Malaysia, patients presented at an earlier age and later stage of disease compared to women in Western countries, rendering breast-conserving surgery less feasible (Norsa'adah et al., 2011; Yip et al., 2014). In fact, Asian breast are smaller whereby breast-conserving surgery resulted in poor aesthetic outcome. Therefore, mastectomy and breast reconstruction provides better options for most patients (Yang et al., 2011).

Determining the optimal proportion of patients who should undergo breast reconstruction after cancer surgery represents a complex task, as the decision-making process about reconstructive options is influenced by patient's preference, surgeon's preference and skills, and available service. These factors may vary widely among

countries or geographical areas because of differences in cultural aspects and economic resources (Garcia-Etienne et al., 2012).

The most frequently reported reasons for having reconstruction given by the reconstruction group included to get rid of the external breast prosthesis, to be able to wear many different types of clothing, to regain femininity and to feel whole again (Reaby, 1998). Meanwhile, the most prevalent reason for not undergoing breast reconstruction was the fear of cancer relapse (Nozawa et al., 2015), fear of the complications (Reaby, 1998) and perception of self-being too old for the procedure (Reaby, 1998). Other factors mentioned were to avoid additional distress on the body from surgery, financial reasons, and beliefs that breast reconstruction is unnecessary (Nozawa et al., 2015). Moreover, the lack of information regarding reconstruction (Postolica et al., 2013), financial implications (Postolica et al., 2013; Shameem et al., 2008), inequity of access to optimal treatment (Shameem et al., 2008) and fear of additional surgery (Shameem et al., 2008) remain significant barriers to reconstructive surgery.

The surgeon's opinion has a major influence and women with breast cancer should be considered as a vulnerable population in need for better information related to reconstruction after mastectomy (Postolica et al., 2013). High-referral surgeons and low-referral surgeons also had different beliefs about women's preferences for reconstruction, with the low-referral surgeons perceiving more access barriers (cost, availability of plastic surgeons) and a lower patient priority for reconstruction (Alderman et al., 2007).

Although women who had completed breast reconstruction showed higher self-evaluations of physical attractiveness and were more active, breast reconstruction is yet to be widely accepted (Nozawa et al., 2015; Postolica et al., 2013). The rate of reconstructive surgery post-mastectomy is still low in Malaysia despite the increasing availability of plastic surgery service throughout the country (Shameem et al., 2008).

This study aims to discern the perception of women and general surgeons towards breast reconstruction after mastectomy especially with regards to women over East Coast of Malaysia and Hospital Kuala Lumpur and to ascertain the factors that would favor towards reconstruction or against it. Additional effort is necessary to broaden the use of breast reconstruction and to ensure equitable access to it.

2.0 Study Objectives

2.1 General Objective

1. To assess surgeons' and patients' perception on breast reconstruction post-mastectomy.

2.2 Specific Objectives

1. To determine surgeons' factors in influencing discussion regarding breast reconstruction with patient, frequency of referral, and reasons for decisions to refer breast cancer patients for reconstructive surgery post-mastectomy
2. To determine factors associated with the hypothetical criticisms of breast reconstruction in breast cancer patient post-mastectomy among general surgeons, and its association with discussion with patients and referral for reconstructive surgery.
3. To determine reasons for breast cancer patients opting in or out of breast reconstruction post mastectomy
4. To compare between general surgeons' & patients' view and interest in breast reconstruction post-mastectomy

2.3 Hypotheses

1. General surgeons have low emphasis placed on the role of breast reconstruction in post-mastectomy patients.
2. The patients undergoing mastectomy were not keen for breast reconstruction despite pre-operative explanation for breast reconstruction

3.0 Methodology

3.1 Subject

1. Study populations consist of
 - a. All general surgeons in government and teaching hospitals in East Coast Malaysia (Hospital Universiti Sains Malaysia, Hospital Raja Perempuan Zainab II, Hospital Tanah Merah, Hospital Kuala Krai, Hospital Sultanah Nur Zahirah, Hospital Kemaman, Hospital Tengku Ampuan Afzan, Hospital Sultan Haji Ahmad Shah, Hospital Kuala Lipis and Hospital Kuala Lumpur (HKL))
 - b. Patients who had undergone mastectomy alone and mastectomy with breast reconstruction from January 2000 to December 2015 in Hospital Universiti Sains Malaysia (HUSM) & Hospital Raja Perempuan Zainab II (HRPZ II)
2. HUSM and HRPZ2 are the two referral center for breast reconstruction for Kelantan and Terengganu whereas HKL serve as referral center for state of Pahang.

3. The study will only evaluate the perception of both surgeon and patient towards breast reconstruction by using self-filled questionnaires. There is no intervention or biological sample taken from both subjects. There is thus minimal risk for subjects. It will be conducted in compliance with ethical principles outlined in the Declaration of Helsinki and Malaysian Good Clinical Practice Guideline.
4. Sampling methods
 - a. Universal sampling is used for the surgeons
 - b. Universal sampling is used among patient without breast reconstruction.
 - c. Universal sampling is used in data collection for patients with breast reconstruction in view of small number of population among them.
5. Recruitment of subject and informed consent seeking
 - a. Formal letter will be forwarded to head department of the government and university hospitals in Kelantan, Terengganu, Pahang and HKL. The questionnaire will be posted to one contact person in each institution for distributing and later collect the completed self-filled questionnaires for all surgeons involved.
 - b. The patient who underwent mastectomy with or without breast reconstruction will be sampled from HUSM and HRPZ II. The questionnaire will be handled to patient during their regular visit to breast clinic.
 - c. This research is conducted on a voluntary basis where the selected respondents voluntarily agreed to take part in this study. Informed written consent will be

obtained from all respondents who agreed to take part in this study prior to the commencement of the survey.

6. Duration of human subject involvement

- a. This study will involve post-mastectomy patients with or without breast reconstruction in HUSM & HRPZ II from year 2000 to 2015 with estimated number of 700 patients.
- b. Meanwhile the general surgeon involved will be those working in hospitals in Kelantan, Terengganu, Pahang & Hospital Kuala Lumpur at the time of questionnaire distribution.
- c. The subject will only will take within 10-15 minutes to answer all the questions provided.

7. Data analysis will be done using Statistical Package for Social Science (SPSS) software version 22. Continuous data such will be summarized using central tendency (mean, median or mode) and dispersion (standard deviation, variance or inter-quartile range). Categorical data will be summarized using proportion (%). Logistic regression will be used to predict contributions of surgeons' demographics and practice towards referral and attitude on referring patients for breast reconstruction, reasons for referral and hypothetical criticism on breast reconstruction, associations between hypothetical criticism on breast reconstruction and reasons for referral, patient' demographics with breast reconstruction, and reasons for opting in or out of reconstruction. Statistical significance is sited at $P < 0.05$.